

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

REVISED VERSION

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
15 February 2001 (15.02.2001)

PCT

(10) International Publication Number
WO 01/011453 A2

(51) International Patent Classification⁷: **G06F 17/60**

(21) International Application Number: PCT/US00/22140

(22) International Filing Date: 11 August 2000 (11.08.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/148,289 11 August 1999 (11.08.1999) US

(71) Applicant (for all designated States except US): **PARADIGM INVESTMENT SERVICES, INC.** [US/US]; 71 Arch Street, Greenwich, CT 06830 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **MURPHY, Edward, E.** [US/US]; 11 Meadow Drive, Greenwich, CT 06831 (US).

(74) Agents: **SHAPIRO, Stuart, B.** et al.; Epstein, Edell, Shapiro & Finnan, LLC, Suite 400, 1901 Research Boulevard, Rockville, MD 20850 (US).

(81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK,

DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— with declaration under Article 17(2)(a); without abstract; title not checked by the International Searching Authority

(48) Date of publication of this revised version:
26 September 2002

(15) Information about Correction:

see PCT Gazette No. 39/2002 of 26 September 2002, Section II

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 01/011453 A2

(54) Title: METHOD AND APPARATUS FOR SIMULATING SECURITY TRANSACTIONS BASED ON INFORMATION FROM ACTUAL MARKET TRANSACTIONS FOR CORRESPONDING SECURITIES

(57) Abstract:

PATENT COOPERATION TREATY

PCT

DECLARATION OF NON-ESTABLISHMENT OF INTERNATIONAL SEARCH REPORT

(PCT Article 17(2)(a), Rules 13ter.1(c) and Rule 39)


Applicant's or agent's file reference 1602.00081	IMPORTANT DECLARATION	Date of mailing(day/month/year) 21/05/2002
International application No. PCT/US 00/ 22140	International filing date(day/month/year) 11/08/2000	(Earliest) Priority date(day/month/year) 11/08/1999
International Patent Classification (IPC) or both national classification and IPC G06F17/60		
Applicant PARADIGM INVESTMENT SERVICES, INC. et al.		

This International Searching Authority hereby declares, according to Article 17(2)(a), that **no international search report will be established** on the international application for the reasons indicated below

1. ☒ The subject matter of the international application relates to:
 - a. ☐ scientific theories.
 - b. ☐ mathematical theories
 - c. ☐ plant varieties.
 - d. ☐ animal varieties.
 - e. ☐ essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes.
 - f. ☒ schemes, rules or methods of doing business.
 - g. ☐ schemes, rules or methods of performing purely mental acts.
 - h. ☐ schemes, rules or methods of playing games.
 - i. ☐ methods for treatment of the human body by surgery or therapy.
 - j. ☐ methods for treatment of the animal body by surgery or therapy.
 - k. ☐ diagnostic methods practised on the human or animal body.
 - l. ☐ mere presentations of information.
 - m. ☐ computer programs for which this International Searching Authority is not equipped to search prior art.
2. ☐ The failure of the following parts of the international application to comply with prescribed requirements prevents a meaningful search from being carried out:

☐ the description
 ☐ the claims
 ☐ the drawings
3. ☐ The failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions prevents a meaningful search from being carried out:

☐ the written form has not been furnished or does not comply with the standard.
 ☐ the computer readable form has not been furnished or does not comply with the standard.
4. Further comments:

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer <div style="text-align: right; padding-right: 20px;">M. Rodríguez Nóvoa</div>
--	--

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 203

The claims relate to subject matter for which no search is required according to Rule 39 PCT. Given that the claims are formulated in terms of such subject matter or merely specify commonplace features relating to its technological implementation, the search examiner could not establish any technical problem which might potentially have required an inventive step to overcome. Hence it was not possible to carry out a meaningful search into the state of the art (Art. 17(2)(a)(i) and (ii) PCT; see Guidelines Part B Chapter VIII, 1-6).

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

1 The aforesaid objects may be achieved individually and/or in combination, and
2 it is not intended that the present invention be construed as requiring two or more of the
3 objects to be combined unless expressly required by the claims attached hereto.

4 According to the present invention, a method and apparatus for simulating stock
5 or security transactions determines a security value based on the trading price of that
6 security in an immediately succeeding actual transaction. This results in realistic
7 transaction or trade order processing within stock or securities market simulations.
8 Initially, a participant of a stock simulation or competition (e.g., where each competition
9 participant attempts to achieve the greatest monetary worth and/or portfolio value relative
10 to the other participants under the same or similar conditions) places an order to buy or
11 sell a security using a web site interface hosted on a trade system web server. The order
12 is subsequently forwarded to a transaction processing server and placed on a "queue"
13 until an actual market trade is processed for that particular security. The processing server
14 receives actual market quote or price information, while each order is matched and
15 processed at the price of the first subsequent actual market trade corresponding to that
16 order. In addition, orders are verified against secondary quote information supplied to
17 a trade system update server at the end of a day. Once the trades are verified and
18 processed, the update server posts the trades for each corresponding participant to
19 database tables.

20 The above and still further objects, features and advantages of the present
21 invention will become apparent upon consideration of the following detailed description
22 of specific embodiments thereof, particularly when taken in conjunction with the
23 accompanying drawings wherein like reference numerals in the various figures are
24 utilized to designate like components.

25 BRIEF DESCRIPTION OF THE DRAWINGS

26 Fig. 1 is a schematic block diagram of a trade simulation system of the present
27 invention in communication with end-user systems via a network.

28 Fig. 2 is a block diagram of the trade simulation system of Fig. 1 according to the
29 present invention.

30 Fig. 3A is a procedural flow chart illustrating the manner in which security
31 transactions are simulated according to the present invention.

1 Fig. 3B is a procedural flow chart illustrating the manner in which simulated
2 transactions are verified and adjusted at a predetermined time interval according to the
3 present invention.

4 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 An exemplary configuration for end-user systems to access a trade simulation
6 system of the present invention is illustrated in Fig. 1. Specifically, the configuration
7 includes a trade simulation system 2, a network 4 and one or more end-user systems 6.
8 The trade simulation system and end-user systems are coupled to and communicate with
9 each other via network 4, while any type of communications devices (e.g., modem,
10 network card, gateway, router, etc.) may be utilized to couple the trade simulation and
11 end-user systems to the network. Network 4 is preferably implemented by a wide area
12 network (WAN), such as the Internet, but any type of network (e.g., LAN, WAN,
13 Intranet, etc.) may be employed. Alternatively, any type of communications medium
14 (e.g., wireless, modem, dumb terminal and host arrangement, etc.) may be utilized to
15 couple the trade simulation system and end-user systems. The trade simulation system
16 simulates security transactions (e.g., trade orders) by processing the transactions utilizing
17 actual market information provided to the trade system as described below. Thus, end-
18 users may participate in virtual security transactions in a relatively risk-free environment
19 and observe the results of their transactions. The trade simulation system may simulate
20 transactions for individual investors, or provide the simulation in the form of a
21 competition among plural investors where each investor attempts to achieve the greatest
22 monetary worth and/or portfolio value relative to the other participants under the same
23 or similar conditions (e.g., initial capital, trading rules, quantity of trades, etc.).

24 End-user systems 6 are each typically implemented by a conventional personal
25 or other suitable computer system preferably equipped with a display or monitor 14, a
26 base 16 (i.e., including the processor, memories and internal or external communications
27 devices (e.g., modem, network cards, etc.)), a keyboard 18 and optional mouse 19 or
28 other input device. The end-user systems each include software (e.g., operating system,
29 Internet browser or other network navigation tool, etc.) to communicate with the trading
30 system, and appropriate components (e.g., processor, disk storage or hard drive, RAM,
31 etc.) having sufficient processing and storage capabilities to effectively execute the

1 software. The end-user systems may utilize any of the conventional or commercially
2 available platforms (e.g., Linux, MacIntosh, Unix, OS2, Windows, etc.).

3 The trade simulation system includes a web server 10, middleware 20 and
4 databases 30. The middleware and databases basically process security transactions,
5 while the web server handles communication with the end-user systems as described
6 below. The web server, middleware and databases may be implemented by any quantity
7 of (e.g., one or more) computer systems. By way of example only, web server 10,
8 middleware 20 and database 30 are each implemented by a respective computer system
9 having appropriate software and communications devices (e.g., modem, network card,
10 etc.) to facilitate communications between the respective systems (e.g., via hardwire or
11 wireless connection, modem connection, LAN, WAN, etc.). These computer systems
12 may be disposed locally or remotely from each other and are each typically implemented
13 by a conventional personal or other computer system preferably equipped with a display
14 or monitor, a base (i.e., including the processor, memories and internal or external
15 communication devices (e.g., modem, network cards, router, etc.)), a keyboard and
16 optional mouse or other input device. The trade system includes software (e.g., operating
17 systems, server software, trade processing software, etc.) to communicate with end-user
18 systems 6 and process transaction requests, while the respective computer systems of the
19 trade system each include appropriate components (e.g., processor (e.g., generally at
20 least a Pentium or compatible processor), disk storage or hard drive, RAM, etc.) having
21 sufficient processing and storage capabilities to effectively execute the corresponding
22 server and/or trade processing software. Further, the respective computer systems may
23 utilize any of the commercially available operating systems and/or server software and,
24 under software control, implement the trade system of the present invention for
25 processing simulated security transactions initiated from the end-user computer systems.

26 Referring to Fig. 2, web server 10 typically includes conventional or
27 commercially available web server software and distributes web pages containing text
28 and graphics to end-user systems 6 via network 4 (Fig. 1). A browser residing on an end-
29 user system interprets the web pages and displays a graphical user interface (GUI) to a
30 user for initiating a transaction. Further, each end-user system may receive information
31 from a corresponding user for web pages or forms associated with a specific transaction
32 (e.g., buy page, sell page, etc.) and may enable viewing of various information (e.g.,

1 pending trades, portfolio holdings, transaction history, etc.) from the trade system. Web
2 server 10 further includes software in the form of a "plug-in" 12 (e.g., software that
3 extends the basic features of a software package as though it is part of that package) to
4 authorize user access to the trade system and handle system specific customizations.

5 Web server 10 receives transaction information from end-user systems 6 and
6 forwards the received information to middleware 20 for processing. Middleware 20 is in
7 communication with databases 30 that store information for transaction processing. In
8 particular, databases 30 include a portfolio database 32, a competition database 34, a
9 company database 36 and a quote server database 38. The databases may be implemented
10 by any conventional or other database or storage structure (e.g., files, data structures,
11 etc.), and each database typically resides on the database computer system. However, the
12 databases may reside on any quantity of computer systems as described above. Portfolio
13 database 32 includes a pending transaction table 42, an order table 44, a transaction table
14 46 and a portfolio table 48 that collectively store trade order and position (e.g., standings
15 with respect to participants in a competition) information. Competition database 34
16 includes a family table 41 that stores a set of trading rules for each competition or
17 simulation to verify pending transactions. Company database 36 includes a master table
18 43 that stores company information (e.g., including a CUSIP or unique identification
19 commonly associated with financial instruments or securities) utilized for verification
20 against the trading rules, while quote server database 38 stores stock or security quote
21 information (e.g., current market price quotes) received from an outside or external
22 information source.

23 Middleware 20 receives transaction information from web server 10 and
24 processes transactions requested by end-user systems 6. Specifically, middleware 20
25 includes a transaction manager server 22, a transaction processing server 24 and an
26 update server 26. These servers are typically implemented in software and, by way of
27 example only, reside on the middleware computer system. However, the middleware
28 servers may reside on any quantity of computer systems as described above. Manager
29 server 22 generates customized web (e.g., HTML) pages containing information for
30 display on end-user systems 6, and accepts instructions from the end-user systems for
31 processing transactions. The manager server verifies received transactions against the
32 appropriate rule set stored in the competition database (e.g., for an individual simulation

1 or competition) and enters valid transactions into order table 44 of portfolio database 32
2 for processing by processing server 24.

3 Processing server 24 simulates each transaction in order table 44 by utilizing the
4 trade price from the next occurring actual market transaction for the security specified
5 in the simulated transaction. In particular, processing server 24 determines the presence
6 of a quote (e.g., price) in quote server database 38 for a security specified in a transaction,
7 and verifies each outstanding transaction stored in the order table against the appropriate
8 rule set stored in the competition database (e.g., for an individual simulation, or
9 competition) as described below. Quote information is generally requested from an
10 external source of market information and is stored in quote server database 38. The
11 quote information may further be stored in a cache-type memory device (not shown) on
12 the database or middleware computer systems to enhance information retrieval. The
13 information in quote server database 38 and/or the cache is updated frequently due to
14 changing market conditions. Information may be placed in and removed from the cache
15 based on any conventional or other techniques (e.g., frequently used, first-in first out,
16 etc.). The processing server initially requests quote information from the cache, and
17 proceeds to access the quote server database in the event that the quote information is not
18 currently residing in the cache. Since the cache performs rapid information retrieval
19 relative to the quote server database, use of the cache enhances the rate of information
20 retrieval for the trade system. The request for quote information may be performed on
21 an immediate or real-time basis, or be delayed by any desired time interval (e.g., seconds,
22 minutes, hours, etc.). By way of example only, the trade system employs a twenty
23 minute delay for requesting quote information. The processing server determines the
24 presence of quote information for the specified security approximately once every minute
25 to provide a realistic price for the transaction. In addition, a trigger or notification
26 mechanism may be employed to notify the processing server of changes in quote
27 information. When quote information is received for the transaction, and the transaction
28 complies with the appropriate rule set, the processing server processes the transaction
29 and stores the transaction and associated price in pending transaction table 42 for
30 verification by update processor 26 as described below. This database update may be
31 accomplished on an immediate or real-time basis, or be delayed by any desired time
32 interval.

1 Update server 26 verifies transactions within pending transaction table 42 against
2 market information received from a secondary source (e.g., typically different from the
3 external source described above), preferably at the end of each day. However, this
4 verification may be performed at any desired time interval. If a transaction includes a
5 price beyond an acceptable range from the market information corresponding to that
6 transaction, the update server adjusts the transaction price to be commensurate with the
7 market information and re-processes the transaction with the adjusted price. Valid and
8 adjusted transactions or trades are stored by the update server in transaction table 46 and
9 permanent holding or portfolio table 48 of portfolio database 32.

10 The manner in which the trade system processes user requested transactions is
11 illustrated in Fig. 3A. Initially, a user utilizes an end-user system 6 to access the trade
12 system via network 4 (Fig. 1), and enters transaction or trade order information on
13 appropriate web pages or forms at step 60. The entered transaction information generally
14 includes the security ticker symbol, requested action (e.g., buy, sell, short sell, short
15 cover, etc.), order amount (e.g., quantity of shares, dollar value, percentage of equity,
16 etc.), order type (e.g., market, limit, stop loss, etc.), limit price (e.g., if a limit or stop loss
17 order), order duration (e.g., quantity of days) and allowance of partial order fill (e.g., all
18 or none). The transaction information may alternatively include any information desired
19 and/or required to process the transaction. The web server and plug-in perform user
20 authorization and interact with the end-user system to display information to and retrieve
21 information from the user as described above. The transaction manager server receives
22 the entered transaction information from the web server and verifies the transaction
23 against the appropriate trading rules stored in the competition database (e.g., for
24 individual simulations or a competition) at step 62. A specific rule set stored in the
25 competition database is typically utilized for competitions, while a default rule set is
26 generally utilized for transaction simulations of individual investors (e.g., investors not
27 participating in a competition). The trading rules may include various criteria for
28 determining valid transactions (e.g., allowance of short selling, stock price within order
29 price limits, market capitalization of security within market capitalization limits, dollar
30 volume of stock order within a percentage of historical trading volume limits, dollar
31 value of order within a percentage of total portfolio dollar value limits, stock symbol
32 allowed for trading by competition rules, etc.). If the transaction is invalid as determined

1 at step 64, the user is prompted to re-enter transaction information. In response to a
2 valid transaction, the manager server, at step 66, stores the transaction in order table 44
3 of portfolio database 32 for processing by the transaction processing server. The
4 processing server retrieves the transactions from the order table and places each
5 transaction in a queue or table until an actual trade price for the security specified in that
6 transaction is available (e.g., an actual market trade for the specified security has
7 occurred and the price is available in the quote server database and/or cache). The
8 processing server repeatedly requests and/or is notified of price or quote information for
9 the specified security within quote server database 38 and/or cache at step 68. The
10 information may be available on an immediate or real-time basis, or on a delayed basis
11 as described above. When the information is available and retrieved as determined at step
12 70, the processing server again verifies the transaction against the appropriate trading
13 rules. If the transaction is invalid as determined at step 72, the user is notified of the
14 invalid transaction at step 73 and processing for that transaction terminates. The user may
15 subsequently enter transaction information associated with additional transactions for
16 processing as described above.

17 If the transaction complies with the appropriate rule set as determined at step 72,
18 the processing server processes the transaction in accordance with the actual market price
19 obtained from quote server database 38 and/or cache at step 74, and stores the processed
20 transaction and price in pending transaction table 42 of portfolio database 32 at step 76.
21 When additional transactions are desired as determined at step 77, the transactions may
22 be entered by the user and processed by the trade system as described above.

23 When a predetermined time interval has expired (e.g., such as at the end of a day),
24 update server 26 verifies the accuracy of transactions within pending transaction table 42
25 by comparing them against actual market information received from a secondary
26 information source (e.g., preferably different than the external source providing
27 information to quote server database 38) as illustrated in Fig. 3B. Specifically, the update
28 server retrieves a transaction from the pending transaction table at step 78 and compares
29 the transaction to the actual market information corresponding to that transaction. If the
30 transaction is invalid (e.g., the transaction price is beyond an acceptable range from the
31 market information) as determined at step 80, the transaction price is adjusted to be
32 commensurate with the market information and the transaction is re-processed by the

1 update server with the adjusted price at step 82. Further, the adjusted transactions are
2 indicated on an exception report, and may alternatively be resolved manually. When
3 additional transactions within pending transaction table 42 require processing as
4 determined at step 83, the transactions are retrieved, verified and adjusted (if necessary)
5 by the update server as described above. In response to processing each transaction
6 within the pending transaction table, the update server stores the valid and adjusted
7 transactions in transaction table 46 and permanent holding or portfolio table 48 of
8 portfolio database 32 at step 84.

9 Transactions for participants of a competition are processed in substantially the
10 same manner described above, but utilize a rule set associated with the particular
11 competition. In addition, the trade system maintains information relating to the position
12 or standing of each participant relative to other participants within the competition.

13 The trade processing software of the trade system of the present invention is
14 preferably implemented in the 'C' programming language, but may be implemented in
15 any suitable computer language. Further, the software of the present invention may be
16 developed by one of ordinary skill in the computer and/or programming arts based on the
17 functional description contained herein and the flow charts illustrated in the drawings.
18 Moreover, references herein of software performing various functions generally refer to
19 computer or processing systems performing those functions under software control.

20 It will be appreciated that the embodiments described above and illustrated in the
21 drawings represent only a few of the many ways of implementing a method and apparatus
22 for simulating security transactions based on information from actual market transactions
23 for corresponding securities.

24 The computer systems of the end-user and trade systems may be implemented by
25 any quantity of any personal or other type of computer system (e.g., IBM-compatible,
26 Apple, Macintosh, laptop, palm pilot, etc.). These computer systems may include any
27 commercially available operating system (e.g., Windows, OS/2, Unix, Linux, etc.), any
28 commercially available or custom software (e.g., server software, browser software, trade
29 processing software, etc.) and any types of input devices (e.g., keyboard, mouse, voice
30 recognition, etc.). It is to be understood that the trade processing software of the trade
31 system may be implemented in any desired computer language. The computer systems
32 of the end-user and trade systems may alternatively be implemented by hardware or other

1 processing circuitry. The various functions of the web server, middleware and databases
2 may be distributed in any manner among any quantity (e.g., one or more) of computer
3 or processing systems or circuitry where the computer systems may be disposed locally
4 or remotely of each other and communicate via any suitable communications medium
5 (e.g., LAN, WAN, Intranet, Internet, hardwire, modem connection, wireless, etc.). The
6 software and/or algorithms described above and illustrated in the flow charts may be
7 modified in any manner that accomplishes the functions described herein.

8 The network may be implemented by any communications network or medium
9 (e.g., LAN, WAN, Internet, Intranet, direct connection, modem connection, wireless,
10 etc.). The trade system and end-user systems may include any conventional or other
11 communications devices to communicate over the network.

12 The web server may accommodate any quantity of end-user systems, and include
13 any conventional or other web server software. The plug-in module may alternatively
14 be implemented as a separate stand-alone program or software module. Further, the web
15 server may accommodate any type of web page or form, and provide any type of user
16 interface to the end-user systems. The user interface may provide or obtain any desired
17 information from the user.

18 The functions of the middleware servers (e.g., manager, processing and update
19 servers) may be distributed in any manner among any quantity (e.g., one or more) of
20 computer or processing systems or circuitry. The computer systems implementing the
21 middleware servers may be disposed locally or remotely of each other and communicate
22 via any suitable communications medium (e.g., LAN, WAN, Intranet, Internet, hardwire,
23 modem connection, wireless, etc.). The middleware servers may access the databases via
24 any suitable communications medium, devices, query language or protocols. The update
25 server may verify the transactions at any desired time interval (e.g., hourly, daily, etc.).
26 The processing server may request quote information at any desired interval (e.g.,
27 seconds, minutes, etc.) and/or be notified of quote information changes by any
28 conventional or other mechanisms.

29 The databases of the present invention (e.g., portfolio, competition, company,
30 quote server, etc.) may be implemented by any quantity of conventional or other
31 databases or storage structures (e.g., file, data structure, etc.), may be arranged in any
32 fashion and may store any desired information. The databases may reside on any

1 quantity of computer or processing systems disposed locally or remotely of each other
2 and communicating via any suitable communications medium, devices and protocols
3 (e.g., LAN, WAN, Intranet, Internet, hardwire, modem connection, wireless, etc.). The
4 databases may each include any quantity of tables containing any desired information.
5 The quote server database may be refreshed or updated at any desired intervals (e.g.,
6 seconds, minutes, hours, etc.), while market information for the quote server database and
7 update server may be obtained from any desired information source. The information
8 sources for the quote server database and update server may be the same or different
9 sources. Further, any quantity of information sources may be utilized to perform any
10 quantity of verifications at any desired time intervals. The information from a source
11 may be requested or available on an immediate or real time basis, or be available on a
12 delayed basis utilizing any desired time interval. The cache may be implemented by any
13 type of memory device and/or specific memory locations within computer system
14 memory, may store any desired information, and may have any desired storage capacity.
15 The cache information may be updated at any desired interval, while information may
16 be replaced in the cache utilizing any conventional or other techniques (e.g., frequently
17 used, first in first out (FIFO), etc). The trade system may be implemented with or without
18 the cache.

19 The trade system software may be available on a recorded medium (e.g., floppy
20 diskettes, CD-ROM, memory devices, etc.) for use on stand-alone systems or systems
21 connected by a network, or may be downloaded (e.g., in the form of carrier waves,
22 packets, etc.) to systems from a network.

23 The rule sets for the trade system may include any quantity of any types of
24 conditions or constraints to determine valid transactions. The trade system may utilize
25 any quantity of rule sets, and may utilize the same or different rule sets for individual
26 simulations or competitions. The competitions may accommodate any quantity of
27 participants. The user may enter any desired information in any fashion to initiate a
28 transaction. The transactions may be processed by using any actual trade price (e.g., at
29 any prior, current or delayed interval) or any quantity of actual trade prices that may be
30 combined in any fashion to arrive at a trade price (e.g., averaging trade prices, etc.). The
31 adjustment by the update server may be accomplished in any desired manner utilizing any
32 desired technique to analyze the market information and arrive at an acceptable price

1 (e.g., averaging, high and low prices, etc.). Further, the offset from the market
2 information for determining acceptable trade prices may be any desired range or offset.
3 In addition, any desired market information may be utilized by the update server to
4 determine transaction validity.

5 The present invention is not limited to the specific applications disclosed herein,
6 but may be utilized in substantially the same manner described above to simulate
7 transactions or other events based on actual occurrence of corresponding events from
8 which information may be obtained. The functions of the web server, middleware server
9 and databases may be combined, separated and/or distributed in any manner among any
10 quantity of software modules and/or computer systems. The queue may be implemented
11 by any suitable data structure (e.g., stack, list, array, etc.), file, database or other storage
12 structure.

13 From the foregoing description it will be appreciated that the invention makes
14 available a novel method and apparatus for simulating security transactions based on
15 information from actual market transactions for corresponding securities wherein
16 security transactions are simulated by utilizing information from the next occurring actual
17 market transactions for the securities specified in the simulated transactions.

18 Having described preferred embodiments of a new and improved method and
19 apparatus for simulating security transactions based on information from actual market
20 transactions for corresponding securities, it is believed that other modifications,
21 variations and changes will be suggested to those skilled in the art in view of the
22 teachings set forth herein. It is therefore to be understood that all such variations,
23 modifications and changes are believed to fall within the scope of the present invention
24 as defined by the appended claims.

What is Claimed is:

- 1 1. A system for simulating user entered transactions based on information
2 from actual transactions corresponding to said user entered transactions comprising:
3 an interface unit to communicate with at least one end-user system and provide
4 information to and receive transactions entered into each end-user system by a
5 corresponding user;
6 a database system to store information pertaining to said user entered transactions
7 and said actual transactions, wherein said actual transaction information is received by
8 said database system from a first external information source at particular time intervals;
9 and
10 a transaction simulator in communication with said interface unit and said
11 database system to retrieve said user entered transactions from said interface unit and
12 process each retrieved transaction in accordance with said actual transaction information
13 stored in said database system associated with a next occurring actual transaction
14 corresponding to that retrieved transaction.
- 1 2. The system of claim 1 wherein said each end-user system and said
2 interface unit communicate over a network.
- 1 3. The system of claim 1 wherein said database system receives said actual
2 transaction information from said first external information source on a real time basis.
- 1 4. The system of claim 1 wherein said user entered and actual transactions
2 include security transactions.
- 1 5. The system of claim 4 wherein said security transactions include buy and
2 sell orders, and said transaction simulator utilizes price information within said actual
3 transaction information associated with securities specified in said user entered
4 transactions to process said user entered transactions.
- 1 6. The system of claim 1 wherein said transaction simulator includes:

2 a manager processor to receive and verify said user entered transactions, said
3 manager processor including:
4 a manager retrieval module to retrieve said user entered transactions from
5 said interface unit;
6 a manager verification module to verify said received transactions against
7 valid transaction criteria stored in said database system; and
8 a manager storage module to store said verified transactions in said
9 database system;
10 a transaction processor to process said verified transactions, said transaction
11 processor including:
12 a database access module to retrieve said verified transactions from said
13 database system;
14 a transaction processing module to process each retrieved verified
15 transaction in accordance with said actual transaction information pertaining to said next
16 occurring actual transaction corresponding to that retrieved verified transaction;
17 a verification module to verify said processed transactions against said
18 valid transaction criteria; and
19 a storage module to store said verified processed transactions in said
20 database system; and
21 an adjustment processor to verify and adjust said processed transactions at
22 predetermined time intervals, said adjustment processor including:
23 an adjustment retrieval module to retrieve said processed transactions
24 from said database system;
25 an adjustment verification module to verify said processed transactions
26 against information relating to actual transactions received by said update processor from
27 a second external information source;
28 a transaction adjustment module to adjust transaction information of each
29 invalid transaction in accordance with said received transaction information from said
30 second information source and to re-process that invalid transaction with said adjusted
31 transaction information; and
32 an adjustment storage unit to store valid and adjusted transactions in said
33 database system.

1 7. The system of claim 6 wherein said adjustment processor verifies and
2 adjusts said processed transactions at the end of a day.

1 8. The system of claim 6 wherein said first and second external information
2 sources are different.

1 9. The system of claim 6 wherein said database system includes:
2 a portfolio database to store information pertaining to said user entered, verified
3 processed, valid and adjusted transactions;
4 a competition database to store said valid transaction criteria;
5 a company database to store information pertaining to companies associated with
6 said user entered transactions for use in verifying those transactions against said valid
7 transaction criteria stored in said competition database; and
8 a quote database to store information pertaining to said actual transactions for use
9 by said transaction processor to process said verified transactions.

1 10. The system of claim 1 further including a cache memory device having
2 a greater information retrieval rate than said database system and selectively storing
3 information pertaining to said actual transactions, wherein said transaction simulator
4 accesses said cache for said actual transaction information corresponding to said each
5 retrieved transaction and subsequently proceeds to access said database system for that
6 actual transaction information in response to that actual transaction information not
7 residing in said cache.

1 11. The system of claim 1 further including a competition processor to
2 accommodate plural users and facilitate transaction simulations in the form of a
3 competition among said plural users, wherein said competition module maintains
4 information relating to the standing of each user within said competition.

1 12. A program product apparatus having a computer readable medium with
2 computer program logic recorded thereon for facilitating simulation of user entered

3 transactions based on information from actual transactions corresponding to said user
4 entered transactions, said program product apparatus comprising:
5 an interface unit to communicate with at least one end-user system and provide
6 information to and receive transactions entered into each end-user system by a
7 corresponding user;
8 a database system to store information pertaining to said user entered transactions
9 and said actual transactions, wherein said actual transaction information is received by
10 said database system from a first external information source at particular time intervals;
11 and
12 a transaction simulator in communication with said interface unit and said
13 database system to retrieve said user entered transactions from said interface unit and
14 process each retrieved transaction in accordance with said actual transaction information
15 stored in said database system associated with a next occurring actual transaction
16 corresponding to that retrieved transaction.

1 13. The program product apparatus of claim 12 wherein said database system
2 receives said actual transaction information from said first external information source
3 on a real time basis.

1 14. The program product apparatus of claim 12 wherein said user entered
2 transactions include buy and sell orders for securities, and said transaction simulator
3 utilizes price information within said actual transaction information associated with
4 securities specified in said user entered transactions to process said user entered
5 transactions.

1 15. The program product apparatus of claim 12 wherein said transaction
2 simulator includes:
3 a manager processor to receive and verify said user entered transactions, said
4 manager processor including:
5 a manager retrieval module to retrieve said user entered transactions from
6 said interface unit;

7 a manager verification module to verify said received transactions against
8 valid transaction criteria stored in said database system; and
9 a manager storage module to store said verified transactions in said
10 database system;
11 a transaction processor to process said verified transactions, said transaction
12 processor including:
13 a database access module to retrieve said verified transactions from said
14 database system;
15 a transaction processing module to process each retrieved verified
16 transaction in accordance with said actual transaction information pertaining to said next
17 occurring actual transaction corresponding to that retrieved verified transaction;
18 a verification module to verify said processed transactions against said
19 valid transaction criteria; and
20 a storage module to store said verified processed transactions in said
21 database system; and
22 an adjustment processor to verify and adjust said processed transactions at
23 predetermined time intervals, said adjustment processor including:
24 an adjustment retrieval module to retrieve said processed transactions
25 from said database system;
26 an adjustment verification module to verify said processed transactions
27 against information relating to actual transactions received by said update processor from
28 a second external information source;
29 a transaction adjustment module to adjust transaction information of each
30 invalid transaction in accordance with said received transaction information from said
31 second information source and to re-process that invalid transaction with said adjusted
32 transaction information; and
33 an adjustment storage unit to store valid and adjusted transactions in said
34 database system.

1 16. The program product apparatus of claim 15 wherein said database system
2 includes:

3 a portfolio database to store information pertaining to said user entered, verified
4 processed, valid and adjusted transactions;
5 a competition database to store said valid transaction criteria;
6 a company database to store information pertaining to companies associated with
7 said user entered transactions for use in verifying those transactions against said valid
8 transaction criteria stored in said competition database; and
9 a quote database to store information pertaining to said actual transactions for use
10 by said transaction processor to process said verified transactions.

1 17. The program product apparatus of claim 12 further including a
2 competition processor to accommodate plural users and facilitate transaction simulations
3 in the form of a competition among said plural users, wherein said competition module
4 maintains information relating to the standing of each user within said competition.

1 18. A method of simulating user entered transactions based on information
2 from actual transactions corresponding to said user entered transactions comprising the
3 steps of:

4 (a) communicating with at least one end-user system and providing information
5 to and receiving transactions entered into each end-user system by a corresponding user;

6 (b) storing information within a database system pertaining to said user entered
7 transactions and said actual transactions, wherein said actual transaction information is
8 received by said database system from a first external information source at particular
9 time intervals; and

10 (c) processing each user entered transaction in accordance with said actual
11 transaction information stored in said database system associated with a next occurring
12 actual transaction corresponding to that user entered transaction.

1 19. The method of claim 18 wherein step (a) further includes:

2 (a.1) communicating with each end-user system over a network.

1 20. The method of claim 18 wherein step (b) further includes:

2 (b.1) receiving said actual transaction information from said first external
3 information source on a real time basis.

1 21. The method of claim 18 wherein said user entered and actual transactions
2 include security transactions.

1 22. The method of claim 21 wherein said security transactions include buy
2 and sell orders, and step (c) further includes:

3 (c.1) utilizing price information within said actual transaction information
4 associated with securities specified in said user entered transactions to process said user
5 entered transactions.

1 23. The method of claim 18 wherein step (c) includes:

2 (c.1) verifying said user entered transactions against valid transaction criteria
3 stored in said database system;

4 (c.2) processing each verified transaction in accordance with said actual
5 transaction information pertaining to said next occurring actual transaction corresponding
6 to that verified transaction;

7 (c.3) verifying said processed transactions against said valid transaction criteria;
8 and

9 (c.4) verifying and adjusting said processed transactions at predetermined time
10 intervals, wherein step (c.4) further includes:

11 (c.4.1) verifying said processed transactions against information relating
12 to actual transactions received from a second external information source;

13 (c.4.2) adjusting transaction information of each invalid transaction in
14 accordance with said received transaction information from said second information
15 source and re-processing that invalid transaction with said adjusted transaction
16 information; and

17 (c.4.3) storing said valid and adjusted transactions in said database system.

1 24. The method of claim 23 wherein step (c.4) includes verifying and
2 adjusting said processed transactions at the end of a day.

1 25. The method of claim 23 wherein said first and second external information
2 sources are different.

1 26. The method of claim 18 wherein step (b) further includes:
2 (b.1) selectively storing information pertaining to said actual transactions in a
3 cache memory device having a greater information retrieval rate than said database
4 system; and
5 step (c) further includes:
6 (c.1) accessing said cache memory device for said actual transaction information
7 corresponding to said each user entered transaction and subsequently proceeding to
8 access said database system for that actual transaction information in response to that
9 actual transaction information not residing in said cache memory device.

1 27. The method of claim 18 further including the steps of:
2 (d) accommodating plural users and facilitating transaction simulations in the
3 form of a competition among said plural users; and
4 (e) determining and maintaining information relating to the standing of each user
5 within said competition.

1 28. A method of simulating user entered transactions based on information
2 from actual transactions corresponding to said user entered transactions comprising the
3 step of:
4 (a) processing each user entered transaction in accordance with actual transaction
5 information stored in a database system and associated with a next occurring actual
6 transaction corresponding to that user entered transaction, wherein said actual transaction
7 information is received by said database system from an external information source at
8 particular time intervals.

1 29. The method of claim 28 wherein step (a) further includes:
2 (a.1) receiving said actual transaction information from said external information
3 source on a real time basis.

1 30. The method of claim 28 wherein said user entered transactions include
2 buy and sell orders for securities, and step (a) further includes:

3 (a.1) utilizing price information within said actual transaction information
4 associated with securities specified in said user entered transactions to process said user
5 entered transactions.

1 31. A system for simulating user entered transactions based on information
2 from actual transactions corresponding to said user entered transactions comprising:

3 an interface unit to communicate with at least one end-user system and provide
4 information to and receive transactions entered into each end-user system by a
5 corresponding user;

6 a database system to store information pertaining to said user entered transactions
7 and said actual transactions, wherein said actual transaction information is received by
8 said database system from a first external information source at particular time intervals;

9 a transaction simulator in communication with said interface unit and said
10 database system to retrieve said user entered transactions from said interface unit and
11 process each retrieved transaction in accordance with said actual transaction information;
12 and

13 an adjustment processor to verify said processed transactions at a predetermined
14 time interval against information relating to actual transactions received from a second
15 external information source and to adjust transaction information of each invalid
16 transaction in accordance with said received transaction information from said second
17 information source for re-processing that invalid transaction with said adjusted
18 transaction information.

1 32. The system of claim 31 wherein said user entered and actual transactions
2 include security transactions.

1 33. A method of simulating user entered transactions based on information
2 from actual transactions corresponding to said user entered transactions comprising the
3 steps of:

4 (a) processing each user entered transaction in accordance with actual transaction
5 information stored in a database system, wherein said actual transaction information is
6 received by said database system from an external information source at particular time
7 intervals;

8 (b) verifying said processed transactions against information relating to actual
9 transactions received from a second external information source at a predetermined time
10 interval; and

11 (c) adjusting transaction information of each invalid transaction in accordance
12 with said received transaction information from said second information source and re-
13 processing that invalid transaction with said adjusted transaction information.

1 34. The method of claim 33 wherein said user entered and actual transactions
2 include security transactions.

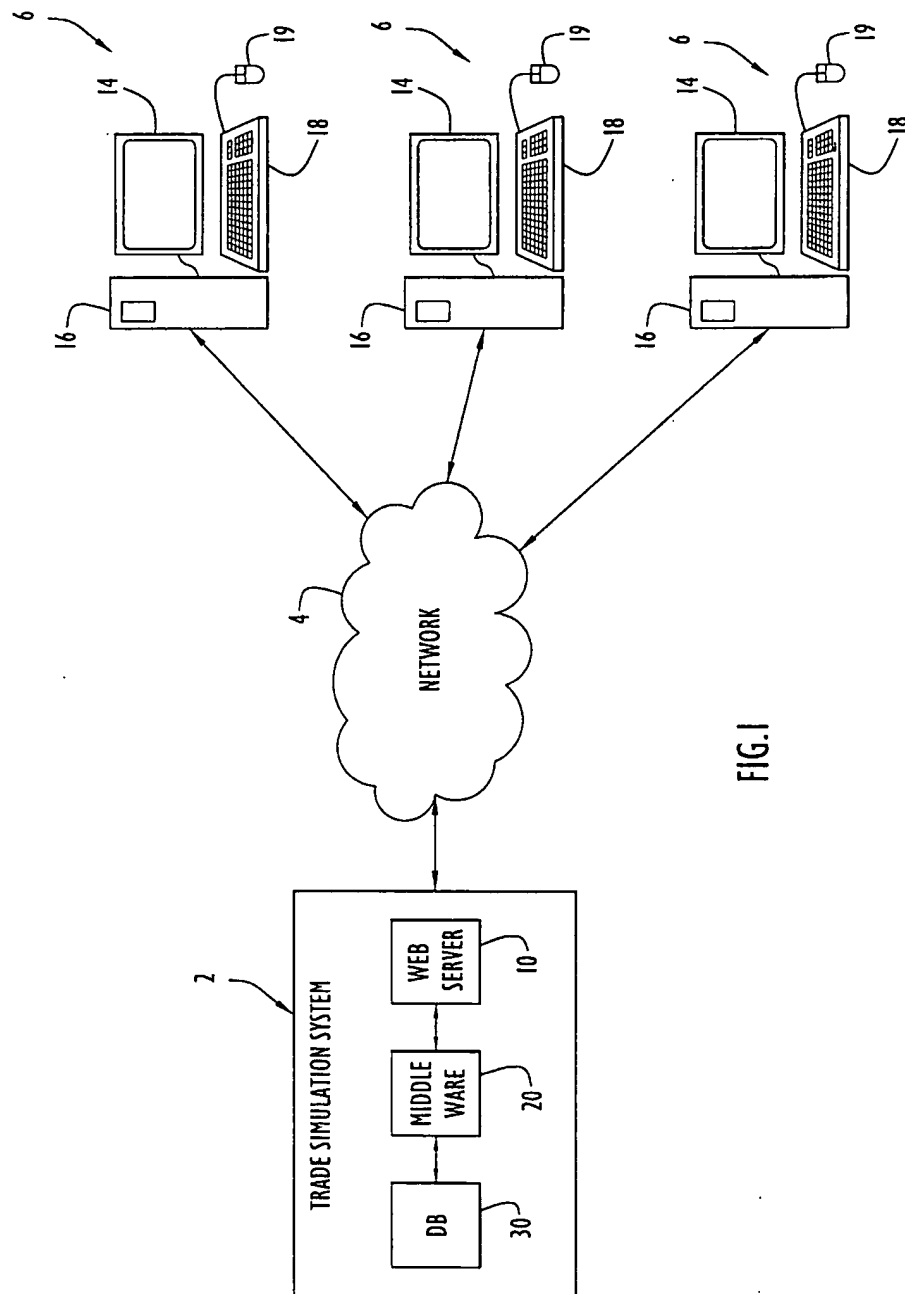


FIG. 1

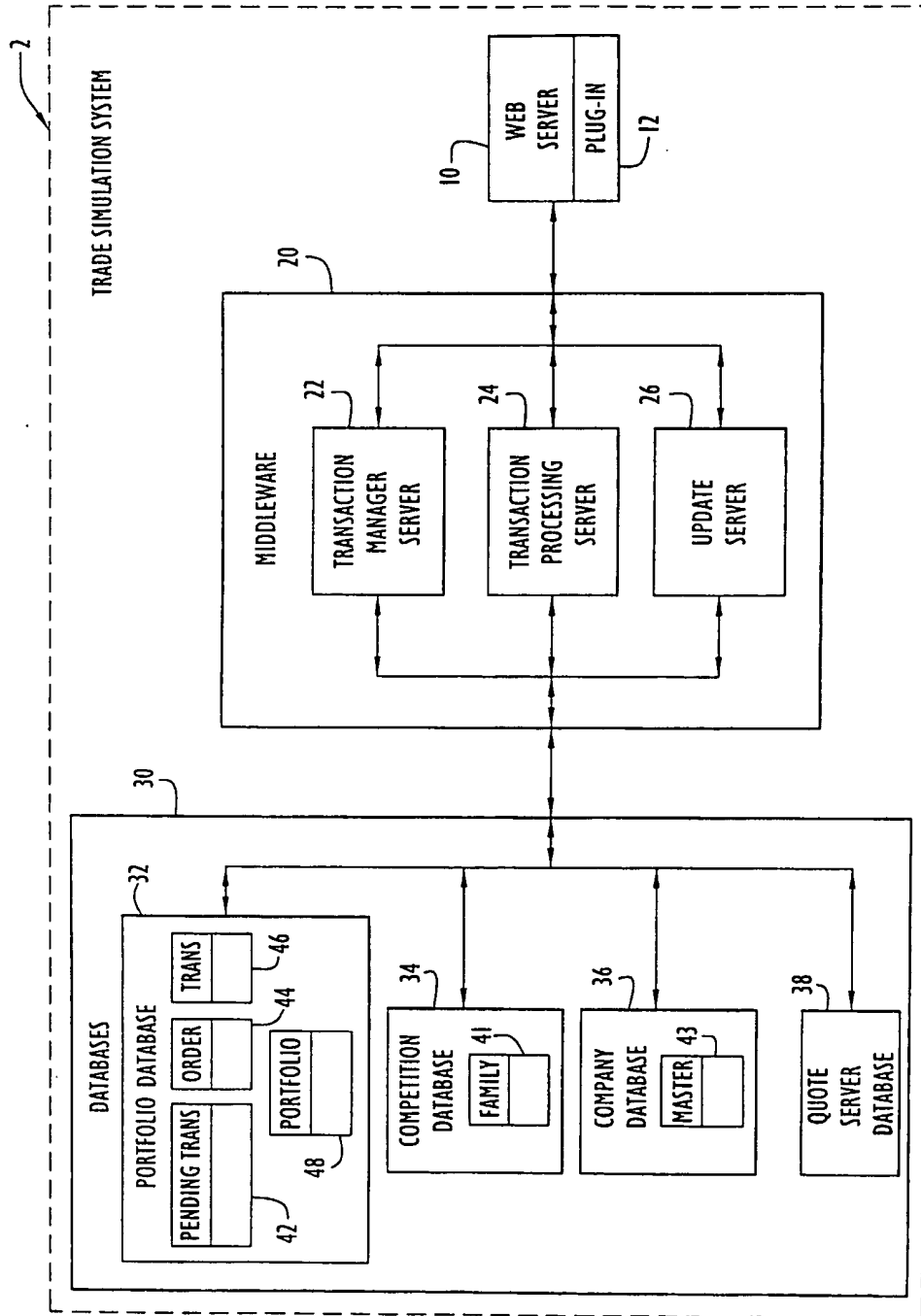


FIG.2

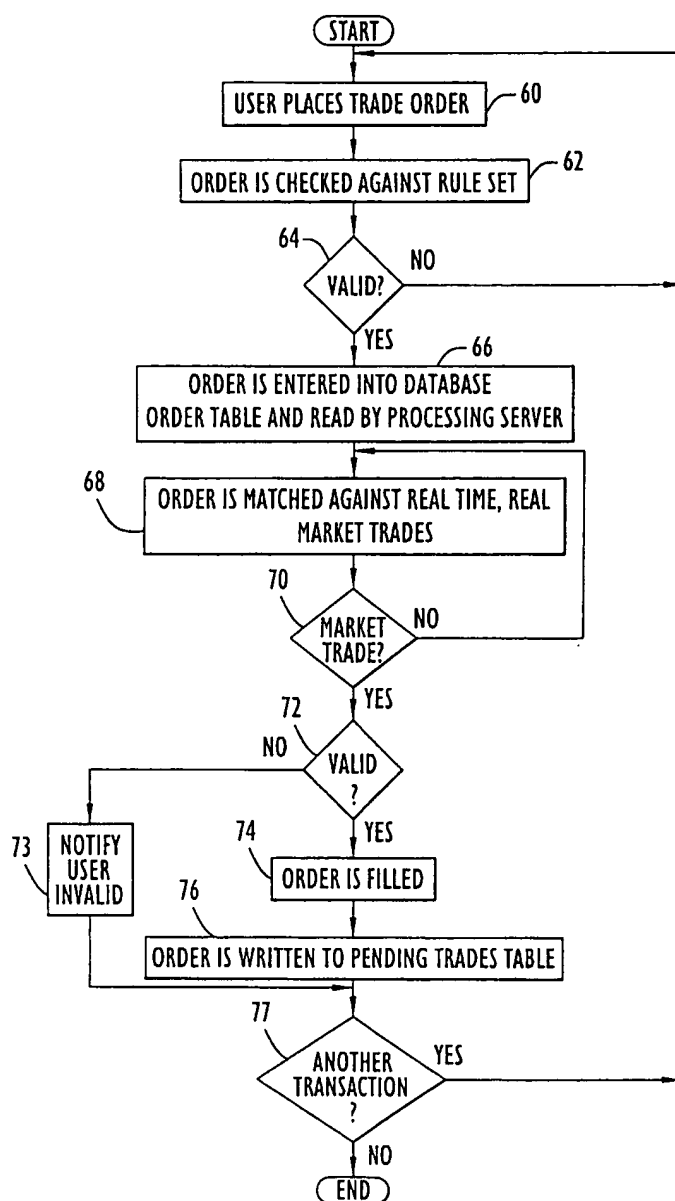


FIG.3A

